

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
14 February 2002 (14.02.2002)

PCT

(10) International Publication Number  
**WO 02/11838 A1**

(51) International Patent Classification<sup>7</sup>: A63F 9/14

[—/US]; 1300 W. Washington Avenue, Chicago, IL 60607 (US).

(21) International Application Number: PCT/US01/21950

(22) International Filing Date: 12 July 2001 (12.07.2001)

(74) Agent: **EKSTRAND, Roy, A.**; Mattel, Inc., M/S M1-1518, 333 Continental Boulevard, El Segundo, CA 90245-5012 (US).

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
09/631,819 3 August 2000 (03.08.2000) US

(71) Applicant (for all designated States except US): **MATTEL, INC.** [US/US]; 333 Continental Boulevard, El Segundo, CA 90245-5012 (US).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

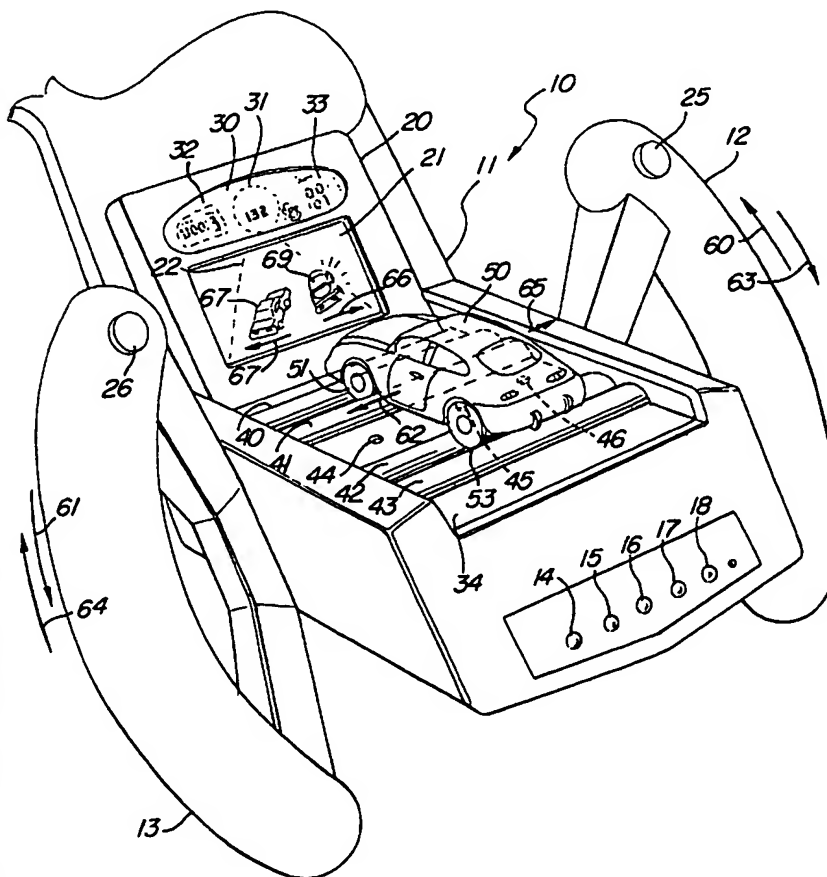
(72) Inventor; and

(84) Designated States (*regional*): European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR).

(75) Inventor/Applicant (for US only): **REHKEMPER, Steve**

[Continued on next page]

(54) Title: **HANDHELD DRIVING SIMULATION GAME APPARATUS**



(57) Abstract: A game apparatus (10) includes a housing (11) supporting a pair of steering wheel segment handles (12, 13) on each side thereof. The steering wheel segment handles (12, 13) support an accelerator button (25) and a brake button (26). The game apparatus (10) includes a housing (11) having a vehicle bed (34) upon which a quartet of rollers (40)(41)(42)(43) are positioned. The housing (11) further supports a liquid crystal display (27) which provides a forward view of a roadway (22) depicting the view from a toy vehicle supported upon the rollers. An internal motor drive system (not shown) rotates the rollers (40)(41)(42)(43) to spin the toy vehicle wheels (51)(52)(53)(54) in accordance with a speed selected by the accelerator button (25) and the brake button (26). A plurality of optical sensors (44)(45)(46) are positioned upon the vehicle bed (34) to sense the lateral position (65) of the toy vehicle as the user executes turning movement of the steering wheel handles (12)(13) and the toy vehicle slides laterally.



**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## HANDHELD DRIVING SIMULATION GAME APPARATUS

## SPECIFICATION

5

Field of the Invention

10 This invention relates generally to handheld game apparatus and particularly to game apparatus simulating movement or driving activities.

Background of the Invention

15 Simulated driving games and instructional devices are well known in the art and have been developed in a variety of forms. For many years, practitioners in the entertainment, game and educational arts have employed various types of apparatus which utilize a  
20 display to simulate movement. Initially, displays simulating movement were developed primarily in educational devices such as driving simulators or the like and were used to teach various types of vehicle driving skills. A typical driving simulator utilized  
25 a driver seat in which the student was seated and which supported a simulated steering wheel of the type used in vehicles. A large display screen was positioned in front of the driver's seat and steering wheel. A projection system or other apparatus was  
30 employed to produce an image on the screen resembling the forward looking view of the driver within a vehicle. Control apparatus operative in response to the steering wheel movements as well as to accelerator pedal and brake pedal activation by the student

controlled the display. Thus, in a typical driving simulation, the image on the display is "scrolled" in correspondence to movement of the steering wheel to depict side-to-side movement. In addition, the  
5 controlling apparatus of the display also scrolls the image forwardly at speeds responsive to accelerator and brake pedal activity. In a properly coordinated and controlled apparatus, the movement and scrolling as well as the rates of movement and scrolling are  
10 sufficiently accurate to impart a "view from the driver's seat" for the student.

Practitioners in the game arts quickly realized the potential of such movement simulators for  
15 providing driving and racing games. Prior to the development of scrolled display apparatus in driving simulators and the like, early driving and racing games were very basic and often employed a roadway or track printed on a scroll or endless belt. A  
20 mechanism was provided for moving the scroll or endless belt to move the "roadway" printed thereon. Typically, a miniature vehicle was supported upon the scroll or endless belt and a mechanism such as a steering wheel or the like was operative to move the  
25 miniature vehicle side-to-side for a steering-like activity. The basic objective was to follow the road as it moved about on the moving scroll or endless belt. An example of such scroll or endless belt type driving game is set forth in U.S. Patent 4,270,306  
30 issued to Klawitter which sets forth a TOY DRIVE SIMULATOR WITH BRAKE having a body in the form of a toy vehicle such as an automobile, boat, snowmobile, tank or spaceship within which a selectively driven belt having a path or paths is movable. A miniature

vehicle intended to be steered is connected to be moved laterally with respect to the belt by manipulating a steering device. The path displaying surface of the belt and the miniature vehicle are viewable in a mirror which is generally but not necessarily in the form of an inside surface of a simulated windshield.

U.S. Patent 4,212,459 issued to Wolf sets forth a RACING GAME having movable terrain and a controlled vehicle having freedom in the vertical and horizontal planes. The movable terrain speeds are controlled by the operator and automatically reduced in response to predetermined improper operation. Obstacles are positioned on the terrain in the form of a belt which are self-righting according to one embodiment. Other obstacles such as ramps, trees, etc. are permanently positioned upon the belt.

U.S. Patent 5,346,398 issued to Nakahata, et al. sets forth a STATIONERY GAME MACHINE having a housing supporting an endless belt driven by a motor. The endless belt is positioned in a generally horizontal plane and depicts a roadway or the like. A stationery vehicle is movable in response to user inputs and is moved side-to-side by steering wheel movements by the game player.

U.S. Patent 5,794,936 issued to Kakizaki sets forth a GAME APPARATUS having a small handheld housing supporting a movable endless belt upon which a roadway is depicted. The housing further supports a simulated steering wheel which is coupled to a miniature vehicle supported above the endless belt. As the endless belt

moves, the roadway undulates and the user attempts to follow the roadway by manipulating the steering wheel. The toy vehicle is moved in response to manipulation of the steering wheel.

5

U.S. Patent 5,265,889 issued to Kojima sets forth a DRIVE GAME APPARATUS having a handheld housing which supports a belt-like sheet having a roadway and obstacles drawn thereon. A pair of rollers and a driving source are used to move the belt-like sheet between a pair of take-up rolls. A moving member carriage having a projection arranged at the rear surface thereof and having its projection biased to be lightly pressed on the surface of the belt sheet is movable in a lateral direction.

U.S. Patent 4,231,571 issued to Watanabe sets forth a PORTABLE OBSTACLE TOY having a housing supporting a small electric drive motor and a diverter transmission. An endless belt is mounted within the housing and is capable of being continuously moved or orbiting upon the mounting member in response to the motor drive. The endless belt includes at least one obstacle on its surface. An object member is slidably mounted on the base of the housing and includes an object attached to the object member and positioned near the surface of the endless belt. As a result, the object is able to slide transversely to the direction of travel of the endless belt to avoid obstacles on the surface thereof.

U.S. Patent 4,589,680 issued to Tsuzuki sets forth a MINIATURE ACTION TOY having a shape generally resembling a race car which is small enough to fit

upon the wrist of a user much like a watch. A small display on the upper surface of the miniature toy supports a laterally movable vehicle indicia while an endless belt within the toy is movable beneath the miniature indicia.

U.S. Patent 4,438,922 issued to Suda sets forth a TOY FOR STEERING A SIMULATED CAR in which cars are pictured on each of two transparent endless belts which are moved by engagement with drums. A light source provides a light for indicating a collision when the pictured car is overlapped with the simulated car moved laterally with respect to the belt by the user in response to a simulated steering wheel.

With the development of effective display devices of the type used in driving simulators or the like, practitioners in the game arts began employing video-based driving games which were very similar to driving instructional devices. For example, U.S. Patent 4,940,234 issued to Ishida, et al. sets forth a VIDEO GAME MACHINE having a cockpit-like console supporting a steering wheel and other operative levers such as a gear shift and the like. The console includes a processor which produces output signals coupled to a television monitor or the like upon which a scrolling image is displayed. A toy vehicle is supported beneath the video display monitor and is movable laterally in response to control signals from the console. In combination, the user is able to manipulate the steering wheel, gear shift and other control apparatus on the console to produce corresponding movements of the toy vehicle laterally

beneath the display screen and corresponding movements of the video image on the television monitor.

U.S. Patent 5,203,563 issued to Loper, III sets forth a SHAKER CONTROL DEVICE having a driving simulation game in which the user is able to operate a steering apparatus together with a brake and gas pedal to control simulated movement appearing on a video screen. In addition, a vibrating device is positioned within the steering apparatus to produce suitable vibrations simulating the vibrations encountered in the driving activity.

U.S. Patent 4,373,722 issued to Kite, et al. sets forth an ELECTRONIC VEHICLE RACE SIMULATOR having a handheld unit supported by a pair of handle grips and having a plurality of display items on the front face thereof. The user is able to operate a gas or accelerator button together with a gear shift button. The game includes a motor sound device which produces engine sounds at various pitches indicative of engine RPM. A simulated staging light of the type employed in dragstrip racing often referred to as a "christmas tree" is provided on the housing face.

U.S. Patent 3,588,107 issued to Kupperman, et al. sets forth a VIBRATING TRACK RACING GAME in which the racing panel is vibrated by a motor operating a rotatable member which engages the racing panel.

U.S. Patent 3,413,001 issued to Ryan, et al. sets forth a BOARD GAME EMPLOYING CORD MEANS TO MOVE GAME PIECES ON A CHANCE BASIS.



While the foregoing described prior art devices have to some extent improved the art and have in some instances enjoyed commercial success, there remains nonetheless a continuing need in the art for evermore improved, interesting, amusing and cost effective driving simulation game apparatus.

#### Summary of the Invention

Accordingly, it is a general object of the present invention to provide an improved handheld driving simulation game apparatus. It is a more particular object of the present invention to provide an improved handheld driving simulation game apparatus which combines the action of a scrolled display with authentic toy vehicle movement.

In accordance with the present invention, there is provided a handheld driving simulation game apparatus comprising: a housing having display means and a vehicle bed; a pair of handles supported on the housing and constructed to be gripped by user's hands; a pair of front rollers rotatably supported on the vehicle bed in a side-to-side parallel alignment; a pair of rear rollers rotatably supported on the vehicle bed in a side-to-side parallel alignment, the pair of rear rollers being spaced from the front pair of rollers by a predetermined distance; a toy vehicle having front and rear rotatable wheels and a vehicle body, the front and rear wheels being spaced front-to-rear by the predetermined distance, the toy vehicle being supported by the front wheels upon the pair of front rollers and by the rear wheels upon the pair of rear rollers; motor drive means, within the housing,

for rotating the front and rear pairs of rollers and causing the front and rear wheels to spin; a plurality of sensors supported by the vehicle bed between the pair of front rollers responsive to proximity of the  
5 toy vehicle body; and control means, coupled to the display means and the plurality of sensors, for creating an image on the display means which is shifted laterally in response to the plurality of sensors, the housing being held by a user grasping the  
10 handles and tilting the housing to slide the toy vehicle laterally upon the roller pairs and the sensors sensing the lateral position of the toy vehicle and the control means shifting the image laterally.

15

#### Brief Description of the Drawings

The features of the present invention, which are believed to be novel, are set forth with particularity  
20 in the appended claims. The invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings, in the several figures of which like reference  
25 numerals identify like elements and in which:

Figure 1 sets forth a perspective view of a handheld driving simulation game apparatus constructed in accordance with the present invention;

30

Figure 2 sets forth a partial rear view of the game apparatus of Figure 1;

Figure 3 sets forth a partial sectioned side view of the game apparatus of Figure 1;

Figure 4 sets forth a partial top view of the vehicle receiving portion of the present invention game apparatus; and

Figure 5 sets forth a block diagram of the control circuit of the present invention game apparatus.

#### Description of the Preferred Embodiment

Figure 1 sets forth a perspective view of a game apparatus constructed in accordance with the present invention and generally referenced by numeral 10. Game apparatus 10 includes a housing 11 supporting a pair of steering wheel handles 12 and 13 which in turn support an accelerator button 25 and a brake button 26 respectively. Housing 11 further defines a vehicle bed 34 upon which a plurality of rollers 40, 41, 42 and 43 are supported. A plurality of optical sensors 44, 45 and 46 are spaced upon vehicle bed 34 at a left position, a center position and a right position respectively.

Game apparatus 10 further includes a display housing 20 supporting a display screen 21 and an indicator panel 30. Indicator panel 30 includes a speed indicator 32, a score indicator 31 and a game mode indicator 33.

Display screen 21 includes a liquid crystal array 27 (seen in Figure 3). In the manner set forth below

in greater detail, display screen 21 shows a road image 22 and a pair of vehicle images 68 and 69 formed thereon.

5           In further accordance with the present invention and by means set forth below in Figure 3, rollers 40 and 41 are rotated by a motor 80 (also seen in Figure 3). Further, rollers 42 and 43 are rotated in the manner seen in Figure 3. In further accordance with  
10 the present invention, a toy vehicle 50 having a plurality of wheels 51, 52, 53 and 54 (wheels 52 and 54 seen in Figure 4) is received upon rollers 40 and 41 and rollers 42 and 43. Rollers 40 and 41 rotate in a front-to-rear direction while rollers 42 and 43  
15 rotate forwardly in a common direction. As a result, the wheels of toy vehicle 50 are rotated while toy vehicle 50 remains supported at the front wheels by rollers 40 and 41 and at the rear wheels by rollers 42 and 43. As a result, the wheels of toy vehicle 50  
20 spin rapidly at a speed corresponding to the rotational speed of rollers 40 through 43.

          In operation, the user grips handles 12 and 13 and positions a thumb of each hand over accelerator  
25 button 25 and brake button 26. Thereafter, pressing accelerator button 25 causes rollers 40 through 43 to rotate which in turn spins wheels 51 through 54 (wheels 52 and 54 seen in Figure 4) of toy vehicle 50. Continued pressing of accelerator button 25 increases  
30 the speed of rotation of rollers 40 through 43 while pressing brake button 26 decreases the rotational speed of rollers 40 through 43. As a result, the user is able to increase or decrease the speed of toy vehicle 50 upon rollers 40 through 43.

In further accordance with the present invention as the user pivots game apparatus 10 in a simulated steering move, toy vehicle 50 slides toward the low  
5 side of rollers 40 through 43. Thus, in the event the user steers game apparatus 10 into a right turn by pivoting handle 12 downwardly in the direction indicated by arrow 63 while pivoting handle 13  
upwardly in the direction indicated by arrow 64, toy  
10 vehicle 50 slides to the right upon rollers 40 through 43 in the direction indicated by arrow 65. Conversely, when the user executes a left turn movement by raising handle 12 in the direction indicated by arrow 60 and lowering handle 13 in the  
15 direction indicated by arrow 61, toy vehicle 50 slides upon rollers 40 through 43 in the direction indicated by arrow 62.

Accordingly, the user is able to execute turning  
20 and steering movements by pivoting handles 12 and 13 which in turn causes toy vehicle 50 to move in the direction toward which a turn has been executed. In accordance with an important aspect of the present invention, optical sensors 44, 45 and 46 sense the  
25 lateral position of toy vehicle 50 upon vehicle bed 34 as the user executes various turning and steering movements. In the manner set forth below in Figures 4 and 5, optical sensors 44, 45 and 46 communicate the lateral position of toy vehicle 50 to the internal  
30 control circuit of game apparatus 10 shown in Figure 5. In response, the control circuit operates upon the displayed image seen upon display screen 21 to provide a corresponding scroll. Thus, for example, when the above-described right turn steering movement of

handles 12 and 13 is executed causing toy vehicle 50 to move to the right in the direction indicated by arrow 65, the "view" seen upon display screen 21 scrolls to the left in the direction indicated by arrow 67. Conversely, when a left turn is executed causing toy vehicle 50 to slide laterally in the direction indicated by arrow 62 to the left upon bed 34, the image depicted on display screen 21 is scrolled or shifted to the right in the direction indicated by arrow 66.

Thus, as the user drives toy vehicle 50 upon rollers 40 through 43 executing various turning and steering maneuvers, the image displayed upon display screen 21 is scrolled correspondingly to depict the view from toy vehicle 50.

Similarly, pressing accelerator button 25 increases the speed of rollers 40 through 43 and communicates a signal to control circuit 70 (seen in Figure 5) which more rapidly moves the images upon display screen 21 "toward" toy vehicle 50. Conversely, pressing brake button 26 reduces the roller speed of rollers 40 through 43 and communicates a signal to control circuit 70 (seen in Figure 5) which slows or stops the movement of image elements upon display screen 21 to depict a reduced velocity or a stopping action.

Figure 2 sets forth a partial rear perspective view of display housing 21 and shows the location of a speaker grille 23. In accordance with the operation of control circuit 70 set forth in Figure 5, game apparatus 10 produces appropriate sounds to accompany

the operation and operational status of toy vehicle 50. Thus, returning temporarily to Figure 1, it will be noted that pressing accelerator button 25 and increasing roller speed of rollers 40 through 43 preferably causes sound circuit 117 (seen in Figure 5) to produce higher pitch engine sounds characteristic of increased acceleration. Conversely, pressing brake button 26 preferably causes sound circuit 117 (seen in Figure 5) to produce screeching or braking sounds to further enhance realistic operation. Returning to Figure 2, the sounds produced by sound circuit 117 are played outwardly through speaker grille 23.

Figure 3 sets forth a partial section side elevation view of game apparatus 10. As described above, game apparatus 10 includes a housing 11 supporting an upwardly extending display housing 20. Display housing 20 includes a display screen 21 behind which a liquid crystal display array 27 is supported. A control circuit 70 set forth below in Figure 5 in greater detail is supported behind liquid crystal display array 27. Control circuit 70 is fabricated utilizing conventional fabrication having a printed circuit board 71 supporting a plurality of integrated circuit components such as components 72 and 73. A plurality of coupling wires 74 provide operative connection between control circuit 70 and liquid crystal display array 27.

Housing 11 defines an interior supporting a motor 80 coupled to a source of battery power (not shown) by connecting wires 83. As described above, a pair of rollers 40 and 41 are supported upon vehicle bed 34 and receive a front wheel 51 of a toy vehicle 50. As

is also described above, a pair of rollers 42 and 43 are supported upon vehicle bed 34 and receive rear wheels 53 and 54 (wheels 52 and 54 seen in Figure 4). Rollers 40 and 41 support end gears 95 and 96 while  
5 rollers 42 and 43 support end gears 97 and 98. Gears 95 and 96 do not engage each other and gears 97 and 98 do not engage each other.

Motor 80 includes an output pulley 81 coupled to  
10 a pulley and gear combination 90 by an endless belt 82. A plurality of drive gears 91, 92, 93 and 94 are serially engaged with gear 90. In addition, gear 91 engages gears 95 and 96 of rollers 40 and 41 while gear 94 engages gears 97 and 98 of rollers 42 and 43.  
15 The function of gears 90 through 94 is to provide rotational power to rollers 40 through 43 in the above-described manner.

In operation once the user presses on button 14  
20 starting operation of the present invention game apparatus, motor 80 causes pulley 81 to rotate in accordance with the desired speed as described above. Rotation of pulley 81 in the direction indicated by arrow 99 causes rotation of pulley and gear 90 in the  
25 direction indicated by arrow 100. Correspondingly, gear 91 rotates in the direction indicated by arrow 101 which in turn rotates gears 95 and 96 in the directions indicated by arrows 105 and 106 respectively. Further, the rotation of gear 91 in the  
30 direction indicated by arrow 101 rotates gears 92, 93 and 94 in the directions indicated by arrow 102, 103 and 104 respectively. The rotation of gear 94 in the direction indicated by arrow 104 causes gears 97 and 98 to rotate in the directions indicated by arrows 107



and 108 respectively. The rotations of gears 95 and 96 produce corresponding rotations of rollers 40 and 41 causing wheel 51 of toy vehicle 50 to rotate in the forward direction indicated by arrow 55. Conversely, 5 the rotation of gears 97 and 98 produce corresponding rotations of rollers 42 and 43 in the directions indicated by arrows 107 and 108 which in turn causes wheel 53 of toy vehicle 50 to rotate in the rearward direction indicated by arrow 56.

10

Accordingly, rotation of rollers 40 and 41 causes front direction rotation of wheels 51 and 52 (seen in Figure 4) while rotation of rollers 42 and 43 causes rearward rotation of wheels 53 and 54 (seen in Figure 15 4). As a result, toy vehicle 50 is maintained in place by opposite direction rotation of its front wheel pair and rear wheel pair. In addition, it will be apparent that as the user controls the speed of motor 80, the rotational speed of rollers 40 through 20 43 is similarly controlled thereby controlling the wheel spin rotation of toy vehicle 50.

Figure 4 sets forth a partial top view of game apparatus 10. Apparatus 10 includes a housing 11 25 defining a vehicle bed 34 upon which a front pair of rollers 40 and 41 and a rear pair of rollers 42 and 43 are supported. Game apparatus 10 further includes a display housing 20 having a display screen 21 supported thereon. Vehicle bed 34 further includes a 30 trio of optical sensors 44, 45 and 46 providing left, center and right position sensing upon vehicle bed 34. For purposes of illustration, dashed-line outlines of three toy vehicles are shown at different lateral positions upon vehicle bed 34. In the dashed-line

position indicated by reference numeral 58, the toy vehicle is substantially centered upon vehicle bed 34. When so positioned, optical sensor 45 responds to the overlying position of the toy vehicle while sensors 44 and 46 do not. As a result, the combination of signal absence from sensors 44 and 46 and the output from sensor 45 communicate to control circuit 70 (seen in Figure 5) that the toy vehicle is occupying the general position shown by dashed-line outline 58.

10

When the toy vehicle is shifted upon vehicle bed 34 to the extreme right position shown by dashed outline 57, it overlies sensor 46 but does not overlie sensors 44 and 45. Accordingly, the output signal combination of sensors 44, 45 and 46 communicates the right side position of the toy vehicle. By way of further example, dashed outline 59 depicts the position of a toy vehicle upon vehicle bed 34 which straddles sensors 44 and 45. Accordingly, the output signal condition received by control circuit 70 in which sensors 44 and 45 respond while sensor 46 is dormant indicates to control circuit 70 (seen in Figure 5) that the toy vehicle occupies a left center position upon vehicle bed 34. Thus, the placement of sensors 44, 45 and 46 allow the output signal communication of a total of five lateral positions of the toy vehicle upon vehicle bed 34. Thus, as the user shifts game apparatus 10 to the left and right in steering motions as described above in Figure 1 sliding a toy vehicle laterally upon rollers 40 through 43, the position of the toy vehicle is capable of resolution to one of five positions upon vehicle bed 34. It will be apparent to those skilled in the art that different vehicle sizes and numbers of

sensors upon vehicle bed 34 may be employed to change the number of vehicle positions capable of being sensed.

5           Figure 5 sets forth a block diagram of control circuit 70 operative within game apparatus 10. Control circuit 70 may be fabricated using conventional digital electronic components and integrated circuit components to maximize the cost  
10           effectiveness thereof. Accordingly, circuit 70 includes a processor 110 which may comprise a conventional microprocessor having an associated memory 112. Memory 112 stores an instruction set which controls the operation of control circuit 70 to  
15           provide the above-described game play. A plurality of buttons 14 through 18 set in a panel 111 (seen in Figure 4) provide game mode selection inputs to processor 110. A brake button 26 and an accelerator button 25 provide input signals to processor 110  
20           indicative of simulated vehicle speed. A trio of optical sensors 44, 45 and 46 are positioned upon vehicle bed 34 in the manner shown in Figure 4 and are operatively coupled to processor 110. An indicated panel 30 (seen in Figure 1) provides various game  
25           parameter indications for game play such as speed or score. A display driver 116 is operatively coupled to processor 110 and is further coupled to a liquid crystal display array 27. Display driver 116 and liquid crystal display 27 operate in accordance with  
30           conventional fabrication techniques to convert digitally encoded signals from processor 110 to corresponding image elements upon the display.

Control circuit 70 further includes a sound circuit 117 operatively coupled to processor 110 which may be fabricated in accordance with conventional fabrication techniques. Sound circuit 117 converts  
5 digitally encoded signals applied by processor 110 to appropriate analog audio signals suitable for driving a conventional speaker or piezoelectric output transducer 118.

10 In operation, the user manipulates buttons 14 through 18 in button panel 111 to set processor 110 to a selected game mode. For example, the game mode selected may be the above-described game set forth in Figure 1. In response, processor 110 utilizes a  
15 stored instruction set within memory 112 to activate sensors 44, 45 and 46 and to place a suitable display upon liquid crystal array 27. In addition, processor 110 outputs basic information to indicator panel 30. Finally, sound circuit 117 receives digitally encoded  
20 signals from processor 110 suitable for the particular operational state of game play. For example, in the absence of pressing accelerator button 25 or brake button 26, processor 110 may output digitally encoded signals corresponding to engine idle indicating the  
25 initial point in game play. If, for example, the user then presses accelerator button 25, processor 110 responds to the stored instruction set within memory 112 to output digital signals to sound circuit 117 which produce a higher pitch engine sound indicating  
30 acceleration. Correspondingly, processor 110 receives instruction from the stored instruction set within memory 112 to configure display driver 116 to initialize display 27 and begin scrolling in the front to back direction indicative of forward motion.

During this process, processor 110 receives inputs from sensors 44 through 46 indicating the lateral position of the toy vehicle upon the game apparatus. Thereafter, the game play continues as described above  
5 with processor 110 utilizing the inputs from sensors 44 through 46 to shift the displayed image upon display 27 in the appropriate direction.  
Concurrently, processor 110 utilizes the inputs from accelerator 25 and brake 26 to control the front-to-  
10 back scrolling of the image upon display 27.

It will be apparent to those skilled in the art that the stored instruction set within memory 112 may include additional features such as crash simulation  
15 or the generation of potentially hazardous objects in the displayed image to enhance game play.

While particular embodiments of the invention have been shown and described, it will be obvious to  
20 those skilled in the art that changes and modifications may be made without departing from the invention in its broader aspects. Therefore, the aim in the appended claims is to cover all such changes and modifications as fall within the true spirit and  
25 scope of the invention.

THAT WHICH IS CLAIMED IS:

1. A handheld driving simulation game apparatus comprising:

a housing having display means and a vehicle bed;

a pair of handles supported on said housing and constructed to be gripped by user's hands;

a pair of front rollers rotatably supported on said vehicle bed in a side-to-side parallel alignment;

a pair of rear rollers rotatably supported on said vehicle bed in a side-to-side parallel alignment, said pair of rear rollers being spaced from said front pair of rollers by a predetermined distance;

a toy vehicle having front and rear rotatable wheels and a vehicle body, said front and rear wheels being spaced front-to-rear by said predetermined distance, said toy vehicle being supported by said front wheels upon said pair of front rollers and by said rear wheels upon said pair of rear rollers;

motor drive means, within said housing, for rotating said front and rear pairs of rollers and causing said front and rear wheels to spin;

a plurality of sensors supported by said vehicle bed between said pair of front rollers responsive to proximity of said toy vehicle body; and

control means, coupled to said display means and said plurality of sensors, for creating an image on said display means which is shifted laterally in response to said plurality of sensors,

said housing being held by a user grasping said handles and tilting said housing to slide said toy vehicle laterally upon said roller pairs and said sensors sensing the lateral position of said toy vehicle and said control means shifting said image laterally.

2. The handheld driving simulation game apparatus set forth in claim 1 wherein said motor drive means rotates said pair of front rollers in a first direction and said pair of rear rollers in a second opposite direction.

3. The handheld driving simulation game apparatus set forth in claim 2 wherein said control means includes a sound circuit for producing a plurality of audible sounds.

4. The handheld driving simulation game apparatus set forth in claim 3 wherein said control means includes a user operable accelerator input and wherein said control means responds to user operation of said accelerator input to rotate said rollers and scroll said image in a front-to-rear scroll.

5. A handheld driving simulation game apparatus comprising:

a housing having a generally horizontal vehicle bed and a pair of handles on each side of said vehicle bed;

a pair of front rollers rotatably supported upon said vehicle bed;

a pair of rear rollers rotatably supported upon said vehicle bed and spaced from said pair of front rollers by a predetermined distance;

motor means, within said housing, for rotating said pair of front rollers and said pair of rear rollers;

a toy vehicle having front and rear wheels separated by said predetermined distance, said toy vehicle front and rear wheels supporting said toy vehicle upon said front and rear rollers and being spun as said rollers rotate; and

a plurality of sensors supported in said vehicle bed constructed to sense the side-to-side position of said toy vehicle upon said vehicle bed and produce a position-dependent game event,

said housing being held by a user by gripping said handles and tilting said housing to cause said toy vehicle to move side-to-side as said pairs of rollers are rotated.



6. The handheld driving simulation game apparatus set forth in claim 5 wherein said housing includes a display screen and means for forming an image thereon and wherein said position-dependent game event includes a lateral scroll of said image.

1 / 3

FIG. 1

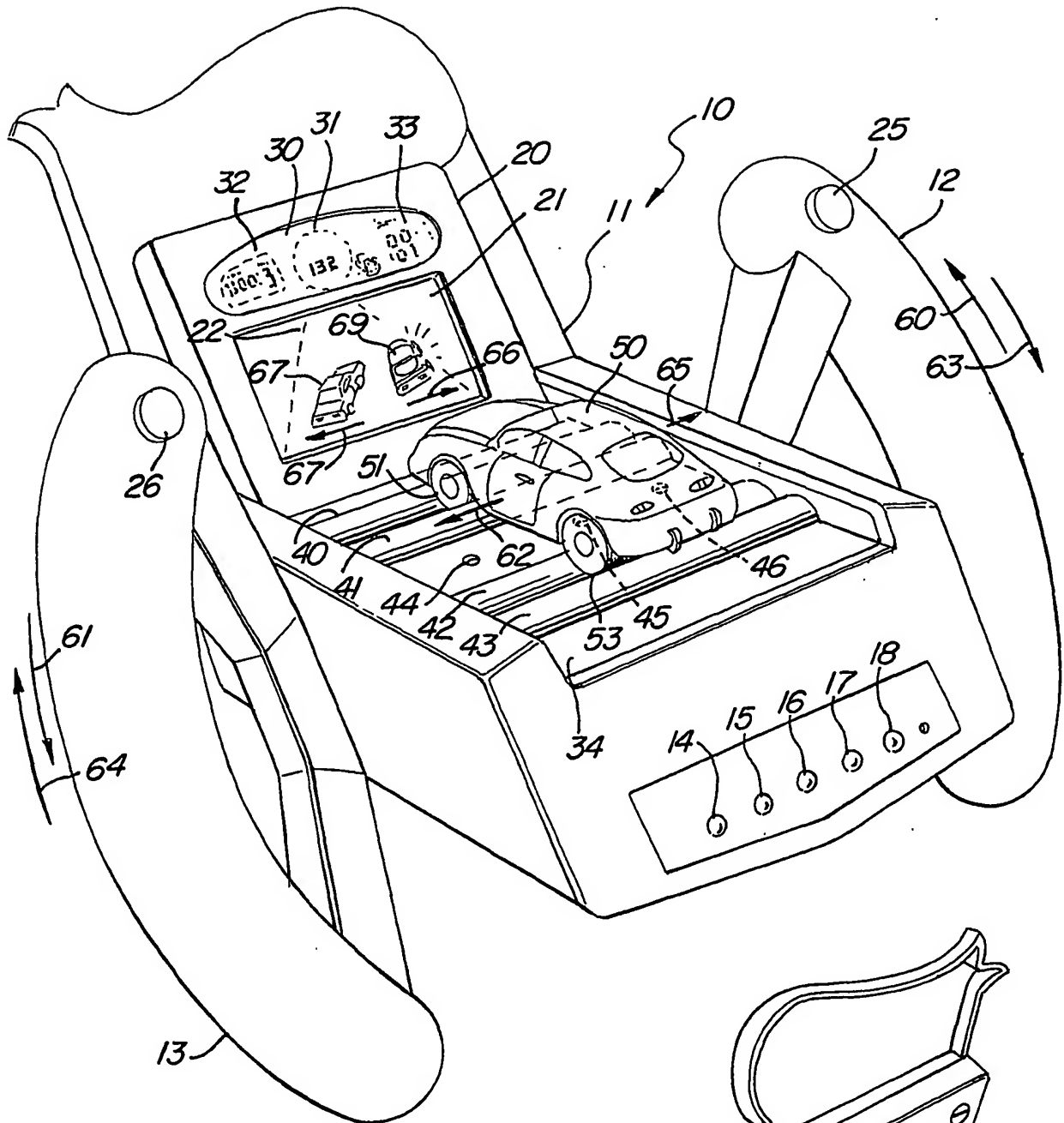
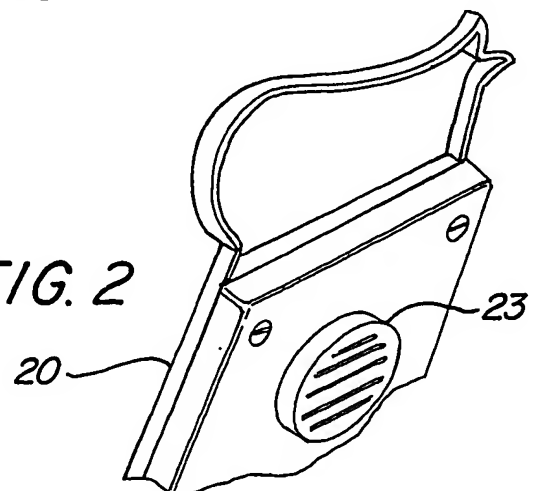


FIG. 2



2/3

FIG. 3

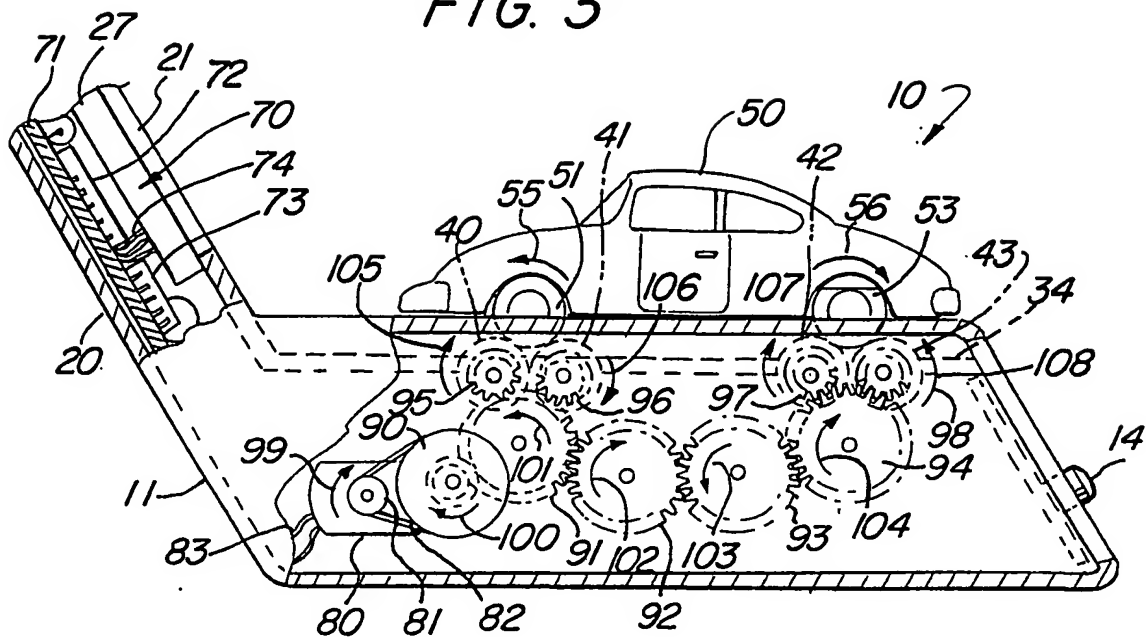
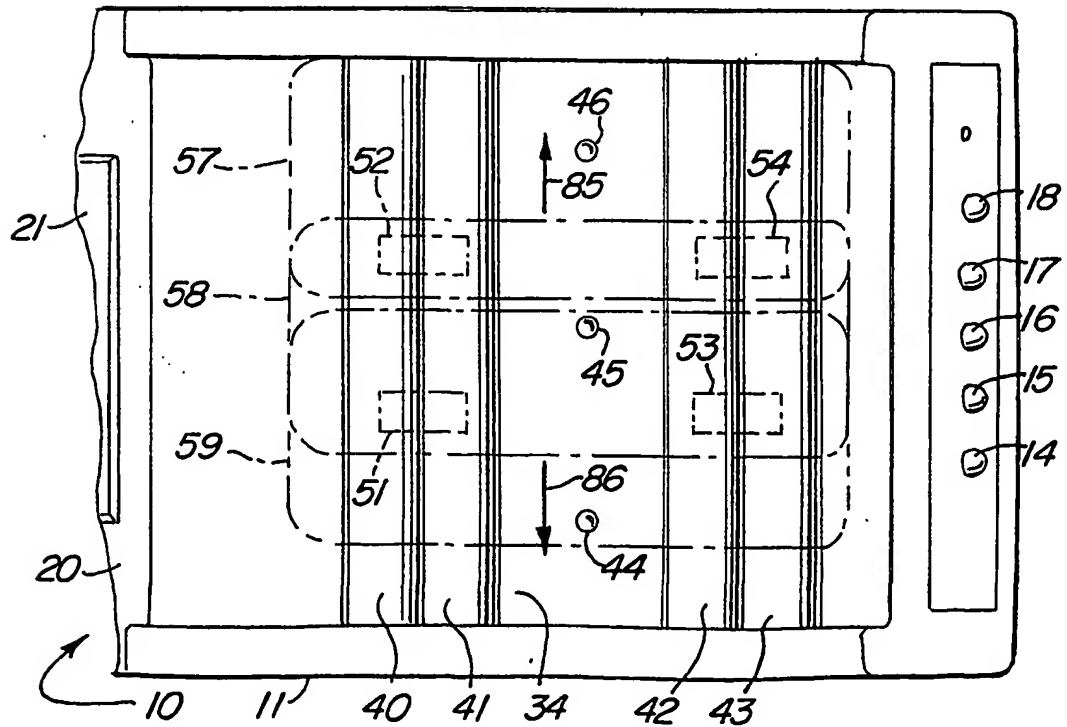


FIG. 4



3/3

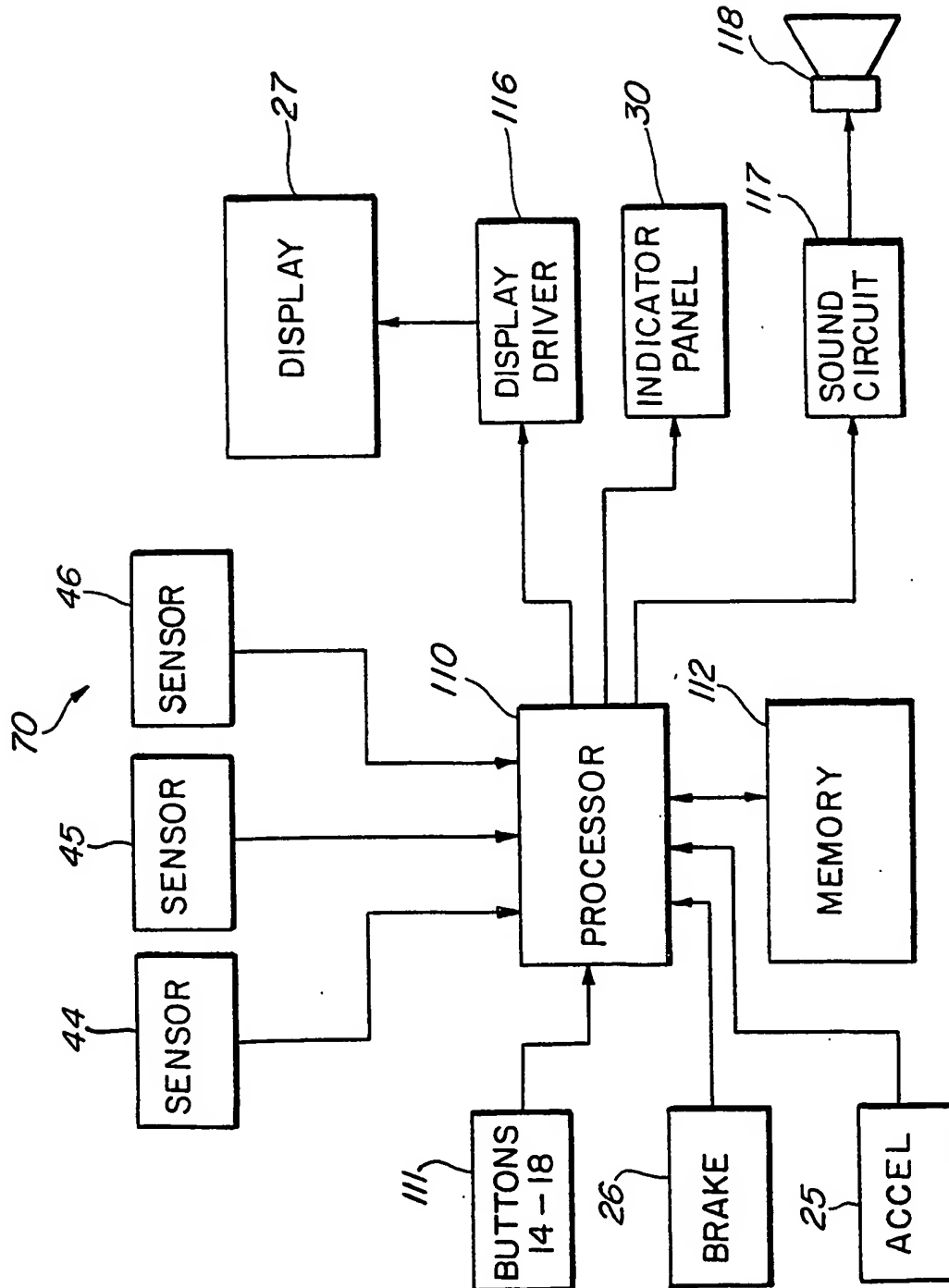


FIG. 5

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/21950

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : A63F 9/14

US CL : 463/6; 273/442

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 463/6, 37; 273/442; 434/29, 61, 69; 446/7

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y, P	US 6,123,547 A (TERESI) 26 September 2000 (26.09.2000), Abstract, Column 2, line 33-Column 4, line 4, and Figure 2.	1,2,3,4,5,6
Y	US 4,932,913 A (RAVIV et al.) 12 June 1990 (12.06.1990), Figure 1	1,2,3,4,5,6

☐

Further documents are listed in the continuation of Box C.

☐

See patent family annex.

<p>* Special categories of cited documents:</p>		"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E"	earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

27 September 2001 (27.09.2001)

Date of mailing of the international search report

10 OCT 2001

Name and mailing address of the ISA/US

Commissioner of Patents and Trademarks  
Box PCT  
Washington, D.C. 20231

Facsimile No. (703)305-3230

Authorized officer

Valencia Martin-Wallace

Telephone No. (703) 308-1118

*Sheila Verley*  
Paralegal Specialist  
Technology Center 3700